**Supplementary table 1. Correlation between factors generated using the complete data (without missing data) and those of the whole data (the imputed dataset)**

|  |  |  |
| --- | --- | --- |
|  |  | Factors generated using complete data (n=165) |
| Factors generated using the whole data (n=307)  |  | Cyclicity | Depression | Atypical vegetative symptom | Psychotic/irritable mania | Elation | Comorbidity |
| Cyclicity | 0.92 | -0.10 | 0.17 | -0.32 | 0.19 | -0.21 |
| Depression | -0.03 | 0.99 | -0.12 | -0.36 | -0.07 | -0.03 |
| Atypical vegetative symptom | 0.11 | 0.12 | 0.90 | -0.06 | -0.16 | 0.08 |
| Psychotic /irritable mania | -0.29 | -0.31 | 0.12 | 0.93 | -0.07 | -0.26 |
| Elation | -0.04 | -0.20 | -0.18 | 0.21 | 0.91 | -0.13 |
| Comorbidity | -0.09 | 0.05 | -0.27 | -0.28 | -0.15 | 0.83 |

To confirm the robustness of 6-factor model from the imputed dataset, we compared factor loadings from the imputed dataset and those of the complete dataset (data of 165 individuals without any missing variable) as follows: Let $F\_{i}^{1}$ be the i’th factor loading vector from the imputed dataset and $F\_{i'}^{2}$ be the i’th factor loading vector from the complete dataset. For each factor loading *i* from first compared set, select factor loading vector *i'* from second compared set which has the largest absolute correlation coefficients. We computed Pearson’s correlation coefficient for $F\_{i}^{1}$ and $F\_{i'}^{2}$ by the equation below.

$$cor\left(F\_{i}^{1},F\_{i'}^{2}\right)=\frac{\sum\_{i}^{}\left(F\_{i}^{1}-\overbar{F\_{i}^{1}}\right)\left(F\_{i'j}^{2}-\overbar{F\_{i'}^{2}}\right)}{\sqrt{\sum\_{i}^{}\left(F\_{ij}^{1}-\overbar{F\_{i}^{1}}\right)^{2}}\sqrt{\sum\_{i}^{}\left(F\_{i'j}^{2}-\overbar{F\_{i'}^{2}}\right)^{2}}}$$

Since all items in dataset were standardized, two factor loading vectors $F\_{i}^{1}$ and $-F\_{i}^{1}$ indicate same factor. Thus, we used absolute correlation coefficients to find similar factor loading vectors.

**Supplementary table 2. Factor structures of BP-I (bipolar I disorder) and BP-II (bipolar II disorder)**

|  |  |
| --- | --- |
| BP-I | BP-II |
| **Factor1 (depression factor)** | **Factor1 (elation factor)** |
| Depressed mood | 0.88 | Elated mood | 0.69 |
| Loss of interest | 0.88 | Talkativeness | 0.66 |
| Fatigue | 0.85 | Increased goal-directed activity | 0.64 |
| Decreased concentration | 0.77 | Flights of ideas | 0.62 |
| Guilty feeling | 0.61 | Grandiose ideas | 0.49 |
| Insomnia | 0.61 | Decreased sleep need | 0.47 |
| Decreased appetite | 0.55 | Guilty feeling | 0.23 |
| Suicidal ideation during depression | 0.52 | Excessive involvement in activity | 0.22 |
| Psychomotor agitation | 0.45 | Somatoform disorder | -0.13 |
| Psychomotor retardation | 0.41 | Alcohol and substance use disorder | -0.20 |
| Psychotic feature during depression | 0.38 | **Factor 2 (comorbidity factor)** |  |
| Seasonality | 0.19 | Bulimia nervosa | 0.65 |
| (Hypo)Manic episode at onset | -0.64 | Panic disorder | 0.58 |
| **Factor 2 (cyclicity factor)** | Phobia | 0.46 |
| Frequent episodes | 0.93 | Psychotic feature during depression | 0.45 |
| Frequent depressive episodes | 0.76 | Eveningness | 0.40 |
| Frequent (hypo)manic episodes | 0.51 | Obsessive compulsive disorder | 0.31 |
| Rapid cycling | 0.18 | Early age at onset (< 22 yrs) | 0.21 |
| **Factor 3 (atypical vegetative symptoms factor)** | Psychomotor retardation | -0.22 |
| Hypersomnia | 0.69 | Irritability | -0.37 |
| Increased appetite | 0.38 | **Factor 3 (cyclicity factor)** |  |
| Early age at onset (< 22 yrs) | 0.34 | Frequent episodes | 0.98 |
| Suicide | 0.26 | Frequent depressive episodes | 0.69 |
| Distractibility | 0.24 | Frequent (hypo)manic episodes | 0.55 |
| **Factor 4 (elation factor)** |  | Rapid cycling | 0.40 |
| Grandiose ideas | 0.53 | **Factor 4 (vegetative symptoms factor)**  |
| Flights of ideas | 0.52 | insomnia | 0.69 |
| Talkativeness | 0.47 | decreased appetite | 0.59 |
| Elated mood | 0.44 | Depressed mood | 0.30 |
| Hyperthymic temperament | 0.28 | Hyperthymic temperament | 0.21 |
| Decreased sleep need | 0.23 | Distractibility | -0.13 |
| Alcohol and substance use disorder | 0.15 | Seasonality | -0.26 |
| **Factor 5 (elation factor-1)** |  | Increased appetite | -0.54 |
| Increased goal-directed activity | 0.57 | Hypersomnia | -0.63 |
| Excessive involvement in activity | 0.50 | **Factor 5 (depression factor)** |  |
| Irritability | 0.28 | decreased concentration | 0.69 |
| Phobia | -0.26 | Loss of interest | 0.62 |
| **Factor 6 (comorbidity factor)**  |  | Suicidal ideation during depression | 0.45 |
| Bulimia nervosa | 0.54 | Fatigue | 0.39 |
| Obsessive compulsive disorder | 0.39 | Suicide | 0.29 |
| Eveningness | 0.31 | Psychomotor agitation | 0.24 |
| Panic disorder | 0.14 | (Hypo)Manic episode at onset | -0.40 |
| Somatoform disorder | -0.10 |  |  |

**Supplementary table 3. Correlation analysis between factor structures of BP-I and BP-II**

|  |  |
| --- | --- |
|  | Factors of BP-II |
| Factors of BP-I  | Factor 1 | Factor 2 | Factor 3 | Factor4 | Factor 5 |
| Factor 1 | -0.11 | -0.21 | -0.26 | 0.25 | 0.69 |
| Factor 2 | -0.10 | -0.06 | 0.82 | -0.16 | -0.04 |
| Factor 3 | -0.18 | -0.35 | -0.18 | -0.70 | 0.39 |
| Factor 4 | 0.60 | -0.12 | 0.18 | 0.15 | -0.10 |
| Factor 5(elation-1) | 0.29 | -0.35 | 0.01 | 0.12 | 0.03 |
| Factor 6 | -0.26 | 0.51 | -0.03 | -0.20 | -0.14 |

Let $F\_{i}^{1}$ be the i’th factor loading vector from BP-I and $F\_{i'}^{2}$ be the i’th factor loading vector from BP-II. For each factor loading *i* from first compared set, select factor loading vector *i'* from second compared set which has the largest absolute correlation coefficients. We computed Pearson’s correlation coefficient for $F\_{i}^{1}$ and $F\_{i'}^{2}$ by the equation below.

$$cor\left(F\_{i}^{1},F\_{i'}^{2}\right)=\frac{\sum\_{i}^{}\left(F\_{i}^{1}-\overbar{F\_{i}^{1}}\right)\left(F\_{i'j}^{2}-\overbar{F\_{i'}^{2}}\right)}{\sqrt{\sum\_{i}^{}\left(F\_{ij}^{1}-\overbar{F\_{i}^{1}}\right)^{2}}\sqrt{\sum\_{i}^{}\left(F\_{i'j}^{2}-\overbar{F\_{i'}^{2}}\right)^{2}}}$$

Since all items in dataset were standardized, two factor loading vectors $F\_{i}^{1}$ and $-F\_{i}^{1}$ indicate same factor. Thus, we used absolute correlation coefficients to find similar factor loading vectors.

Supplementary table 4. weight coefficients of structural equation modeling (SEM) analysis to determine the relations among factors.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | EST | SD | t\_stat | P-value | Variables | EST | SD | t\_stat | P-value |
| Depressed mood | 0.341 | 0.005 | 74.893 | <.0001 | Frequent (hypo)manic episode | 0.216 | 0.008 | 28.311 | <.0001 |
| Loss of interest | 0.333 | 0.005 | 64.406 | <.0001 | Excessive involvement in activity | 0.148 | 0.010 | 15.140 | <.0001 |
| Fatigue | 0.332 | 0.005 | 63.926 | <.0001 | Increased goal-directed activity | 0.119 | 0.007 | 17.578 | <.0001 |
| Decreased concentration | 0.316 | 0.006 | 52.806 | <.0001 | Decreased sleep need | 0.143 | 0.008 | 18.815 | <.0001 |
| Suicide ideation during depression | 0.252 | 0.008 | 32.026 | <.0001 | Hypersomnia | 13.131 | 285.304 | 0.046 | 0.9633 |
| Guilty feeling | 0.258 | 0.008 | 33.641 | <.0001 | Increased appetite | 0.003 | 0.066 | 0.046 | 0.9633 |
| Decreased appetite | 0.198 | 0.008 | 23.949 | <.0001 | Early age at onset | 0.000 | 0.000 | . | . |
| Psychomotor agitation | 0.179 | 0.008 | 21.597 | <.0001 | Suicide | 0.002 | 0.035 | 0.046 | 0.9633 |
| Psychomotor retardation | 0.181 | 0.008 | 21.867 | <.0001 | Insomnia | -0.010 | 0.220 | -0.046 | 0.9633 |
| (Hypo)manic episode at onset | -0.247 | 0.008 | -31.169 | <.0001 | Distractibility | 0.194 | 0.010 | 19.810 | <.0001 |
| Unipolar mania | -0.340 | 0.004 | -80.134 | <.0001 | Psychotic feature during mania | 0.313 | 0.011 | 29.769 | <.0001 |
| Frequent episode | 0.507 | 0.008 | 63.711 | <.0001 | Mixed mania | 0.126 | 0.008 | 16.443 | <.0001 |
| Frequent depressive episode | 0.276 | 0.008 | 35.975 | <.0001 | Irritability | 0.255 | 0.009 | 27.789 | <.0001 |
| Frequent (hypo)manic episode | 0.244 | 0.008 | 32.305 | <.0001 | Bulimia nervosa | 0.124 | 0.006 | 21.725 | <.0001 |
| Rapid cycling | 0.039 | 0.003 | 11.412 | <.0001 | Panic disorder | 0.139 | 0.005 | 25.302 | <.0001 |
| Hyperthymic temperament | 0.042 | 0.005 | 8.102 | <.0001 | Phobia | 0.102 | 0.005 | 19.421 | <.0001 |
| Grandiose idea | 0.227 | 0.009 | 25.554 | <.0001 | Eveningness | 0.103 | 0.006 | 16.009 | <.0001 |
| Talkativeness | 0.236 | 0.008 | 30.396 | <.0001 | Psychotic feature during depression | 0.080 | 0.010 | 8.406 | <.0001 |
| Elated mood | 0.150 | 0.007 | 22.907 | <.0001 | Obsessive compulsive disorder | 0.070 | 0.007 | 9.532 | <.0001 |

Supplementary table 5. Path coefficients of the model constructed using structural equation modeling approach to determine the relations among factors.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable 1 | Variable 2 | EST | SD | t\_stat | P-value |
| Depression | Cyclicity | 0.058  | 0.015  | 3.798  | 0.0001 |
| Depression | Elation | -0.038  | 0.021  | -1.814  | 0.0697 |
| Cyclicity | Elation | 0.077  | 0.018  | 4.190  | <.0001 |
| Depression | Atypical vegetative symptoms | 0.016  | 0.345  | 0.046  | 0.9633 |
| Cyclicity | Atypical vegetative symptoms | 0.002  | 0.033  | 0.046  | 0.9633 |
| Elation | Atypical vegetative symptoms | 0.003  | 0.066  | 0.046  | 0.9633 |
| Depression | Psychotic/ irritable mania  | -0.354  | 0.021  | -17.280  | <.0001 |
| Cyclicity | Psychotic/ irritable mania | -0.235  | 0.019  | -12.213  | <.0001 |
| Elation | Psychotic/ irritable mania | 0.191  | 0.027  | 7.204  | <.0001 |
| Atypical vegetative symptoms | Psychotic/ irritable mania | -0.005  | 0.107  | -0.046  | 0.9633 |
| Depression | Comorbidity | 0.103  | 0.023  | 4.484  | <.0001 |
| Cyclicity | Comorbidity | 0.139  | 0.020  | 6.931  | <.0001 |
| Elation | Comorbidity | -0.063  | 0.028  | -2.281  | 0.0225 |
| Atypical vegetative symptoms | Comorbidity | 0.000  | 0.002  | 0.042  | 0.9668 |
| Psychotic/ irritable mania  | Comorbidity | -0.402  | 0.027  | -14.677  | <.0001 |

Supplementary table 6. weight coefficients of structural equation modeling (SEM) analysis to explore contribution of factors in discriminating bipolar II from bipolar I disorders

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variables | est | sd | t\_stat | P-value | Variables | est | sd | t\_stat | P-value |
| Depressed mood | 0.326  | 0.004  | 74.793  | <.0001 | Talkativeness | 0.230  | 0.008  | 30.197  | <.0001 |
| Loss of interest | 0.319  | 0.005  | 64.387  | <.0001 | Elated mood | 0.142  | 0.006  | 22.140  | <.0001 |
| Fatigue | 0.317  | 0.005  | 63.825  | <.0001 | Frequent (hypo)manic episode | 0.205  | 0.008  | 27.362  | <.0001 |
| Decreased concentration | 0.302  | 0.006  | 52.772  | <.0001 | Excessive involvement in activity | 0.148  | 0.010  | 15.505  | <.0001 |
| Suicide ideation during depression | 0.240  | 0.008  | 31.971  | <.0001 | Increased goal-directed activity | 0.119  | 0.007  | 18.015  | <.0001 |
| Guilty feeling | 0.247  | 0.007  | 33.619  | <.0001 | Decreased sleep need | 0.148  | 0.007  | 20.048  | <.0001 |
| Decreased appetite | 0.189  | 0.008  | 23.923  | <.0001 | Distractibility | 0.024  | 0.015  | 1.595  | 0.1108 |
| Psychomotor agitation | 0.171  | 0.008  | 21.574  | <.0001 | Psychotic feature during mania | 0.045  | 0.028  | 1.596  | 0.1104 |
| Psychomotor retardation | 0.173  | 0.008  | 21.847  | <.0001 | Mixed mania | 0.014  | 0.009  | 1.592  | 0.1114 |
| (Hypo)manic episode at onset | -0.236  | 0.008  | -31.186  | <.0001 | Irritability | 0.028  | 0.017  | 1.596  | 0.1106 |
| Unipolar mania | -0.325  | 0.004  | -80.015  | <.0001 | Bulimia nervosa | 0.114  | 0.006  | 20.352  | <.0001 |
| Frequent episode | 0.509  | 0.008  | 60.029  | <.0001 | Panic disorder | 0.139  | 0.006  | 24.872  | <.0001 |
| Frequent depressive episode | 0.270  | 0.008  | 35.202  | <.0001 | Phobia | 0.099  | 0.005  | 19.078  | <.0001 |
| Frequent (hypo)manic episode | 0.238  | 0.008  | 31.606  | <.0001 | Eveningness | 0.098  | 0.006  | 15.504  | <.0001 |
| Rapid cycling | 0.038  | 0.003  | 11.330  | <.0001 | Psychotic feature during depression | 0.082  | 0.009  | 8.874  | <.0001 |
| Hyperthymic temperament | 0.041  | 0.005  | 8.031  | <.0001 | Obsessive compulsive disorder | 0.071  | 0.007  | 9.945  | <.0001 |
| Grandiose idea | 0.218  | 0.009  | 24.978  | <.0001 |  |  |  |  |  |

Supplementary table 7. Path coefficients in model built using structural equation modeling (SEM) analysis to explore contribution of factors in discriminating bipolar II from bipolar I disorders

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Dependent factors | EST | SD | t\_stat | *P*-value |
| **Depression** | 0.645 | 0.037 | 17.220 | <.0001 |
| **Cyclicity** | 0.304 | 0.032 | 9.503 | <.0001 |
| **Elation** | -0.483 | 0.046 | -10.603 | <.0001 |
| **Psychotic/ mixed mania**  | -16.590 | 10.392 | -1.596 | 0.1104 |
| **Comorbidity** | 0.546 | 0.050 | 10.861 | <.0001 |